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# THREE DIMENSIONAL IMAGE PRESENTING DEVICE

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to an image presenting device, and more particularly to a three dimensional image presenting device having an image presenting plate, multiple 3D image presenting units defined in the image presenting plate and multiple optical fibers each corresponding to one of the 3D image presenting units such that when the image is presented and viewed by a viewer, due to diffusion effect of the 3D image presenting units, an apparent 3D image is observed.

### 2. Description of Related Art

A general commercial billboard is used to pass messages to the passers-by so that they are able to recall, even sub-consciously, the information. One of the most used commercial manners is the use of an image presenting device, such as a TV wall composed of multiple TV sets or a large screen composed of multiple LEDs (light emitting diode) which are controlled by a computer program. Thus, the image presented on the TV wall or the large screen is vivid. However, in either case, the image can only extend in both the X-axis and the Y-axis. That is, the image is two dimensional, as shown in Fig. 1. Although there are illusion movies presenting apparent three dimensional images in the market, the observer in the theater is required to wear a special goggle. Therefore, using the optical feature of the goggle and the difference between two eyes of the observer, apparent three dimensional movies are able to be seen. However, this system is clearly not practical for street advertising as the merchant can not ask each of the passersby to wear the goggle since it is too troublesome and costly.

To overcome the shortcomings, the present invention tends to provide an improved image presenting device to mitigate the aforementioned problems.

1     SUMMARY OF THE INVENTION

2             The primary objective of the present invention is to provide an improved 3D  
3     image presenting device having an image presenting plate with multiple 3D image  
4     presenting units and multiple optical fibers.

5             Another objective of the present invention is to use lenses to disperse the image  
6     to extend the image in the Z-axis such that the three dimensional effect is enhanced.

7             Other objects, advantages and novel features of the invention will become more  
8     apparent from the following detailed description when taken in conjunction with the  
9     accompanying drawings.

10    BRIEF DESCRIPTION OF THE DRAWINGS

11            Fig. 1 is perspective view showing a conventional 2D image presented on a  
12    plane;

13            Fig. 2 is a perspective view showing a three dimensional image is presented  
14    using the structure of the present invention;

15            Fig. 3A is a schematic view showing the first embodiment of the geometric  
16    structure of the 3D image presenting device of the present invention;

17            Fig. 3B is a schematic view showing a different geometric structure of the first  
18    embodiment of the present invention;

19            Fig. 3C is a schematic view showing another geometric structure of the first  
20    embodiment of the present invention;

21            Fig. 4 is a schematic view showing the second embodiment of the present  
22    invention;

23            Fig. 5 is a schematic view showing the third embodiment of the present  
24    invention;

25            Fig. 6 is a schematic view showing the fourth embodiment of the present

1 invention;

2 Fig. 7 is a schematic view showing the fifth embodiment of the present

3 invention;

4 Fig. 8 is a schematic view showing the sixth embodiment of the present

5 invention;

6 Fig. 9 is a schematic view showing the seventh embodiment of the present

7 invention;

8 Fig. 10 is a schematic view showing the eighth embodiment of the present

9 invention;

10 Fig. 11 is a schematic view showing the ninth embodiment of the present

11 invention; and

12 Fig. 12 is a schematic view showing the tenth embodiment of the present

13 invention.

#### 14 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

15 With reference to Figs. 2 and 3A, the 3D image presenting device in accordance  
16 with the present invention includes an image presenting plate (10), multiple optical  
17 fibers (20) (which may be replaced with any appropriate light transmitting element, such  
18 as light bulbs, tubes or screens) and multiple 3D image presenting units (30). Only one  
19 optical fiber (20) and one 3D image presenting unit (30) are shown in this embodiment.

20 The image presenting units (30) are defined in the image presenting plate (10).  
21 In this preferred embodiment, the image presenting units (30) are arcuate cutouts  
22 defined in the image presenting plate (10). Each of the optical fibers (20) has a distal end  
23 (21) which is placed at an entrance of a corresponding one of the image presenting units  
24 (30) or is inserted into the corresponding image presenting unit (30). It is noted that the  
25 optical fiber (20) is an example of a light source, the optical fiber (20) may be replaced

1 with other sources such as a projector. Further, the image presenting unit (30) has a  
2 longitudinal length (C) and a latitudinal length (A) which is larger than the longitudinal  
3 length (C).

4 When the 3D image presenting device of the present invention is in application,  
5 an image is transmitted by the distal ends (21) of the optical fibers (20) and enters the  
6 image presenting units (30). Due to the arcuate shape of the image presenting units (30)  
7 in the image presenting plate (10), the image is dispersed and thus the image has a length  
8 in the Z-axis. When an observer is watching the image presenting plate (10) opposite to  
9 the optical fibers (20), because of the visual difference between the left eye and the right  
10 eye of the observer, the image presented is apparently three dimensional.

11 With reference to Fig. 3B, it is noted that the 3D image presenting plate (10') is  
12 provided with a 3D image presenting unit (30') which is a combination of a passage and  
13 an arcuate recess. The 3D image presenting plate (10') has an arcuate projection (11')  
14 extending out of a side wall of the 3D image presenting plate (10'). The arcuate recess is  
15 defined in the arcuate projection (11'). When the device of the present invention is  
16 application, the distal end (21') of the optical fiber (20) is extended to a joint between  
17 the arcuate recess and the passage. Thus due to the light refraction passing through the  
18 space in the arcuate recess and the arcuate projection (11') of the 3D image presenting  
19 plate (10'), the light from the distal end (21') of the optical fiber (20) is dispersed.  
20 Therefore, the image presented and observed by a viewer is apparently three  
21 dimensional.

22 With reference to Fig. 3C, it is to be noted that the arcuate recess is defined in  
23 the 3D image presenting plate (10') instead of the arcuate projection (11'). When the  
24 distal end (21') of the optical fiber (20) emits a light, the arcuate projection (11') is able  
25 to converge the light to avoid excessive dispersion of the light so as to form the three

1 dimensional image. The 3D image presenting plate (10,10') may be transparent or  
2 translucent. The arcuate projection (11') may be regarded as an optical lens having a  
3 focal length =  $\infty$ . However, if other optical lenses are combined with the arcuate  
4 projection (11'), the focal lengths of the lenses are less than 0.

5 With reference to Fig. 4, a different embodiment of the present invention is  
6 shown and is a combination of two convex lenses and a concave lens, wherein the 3D  
7 image presenting plate (10) is composed of two layers. A mounting seat (40) is attached  
8 to a side of the 3D image presenting plate (10) and has a passage (41) to receive therein  
9 an optical fiber (20). The distal end (21) of the optical fiber (20) is engaged with a side  
10 face of the 3D image presenting plate (10). The 3D image presenting unit (31) is defined  
11 as a space in one layer of the 3D image presenting plate (10) and having a projecting  
12 arcuate face in opposite ends of the space (31) to function as a convex lens. A concave  
13 lens (31') is provided in the other layer of the 3D image presenting plate (10) to align  
14 with the ends of the space (31). That is, the space (31) and the concave lens (31') are  
15 axially aligned.

16 With reference to Fig. 5, the 3D image presenting plate (10) is the same as the  
17 embodiment shown in Fig. 4 and also has a mounting seat (40) for receiving therein the  
18 optical fiber (20). The 3D image presenting unit (32) has a convex end and a concave  
19 end, wherein the concave lens (31') is retained in the 3D image presenting plate (10).  
20 The distal end (21) of the optical fiber (20) corresponds to and engages with the convex  
21 end of the 3D image presenting unit (32) (the space).

22 With reference to Fig. 6, it is noted that the space (33) (the 3D image presenting  
23 unit) is the same as that shown in Fig. 4. The distal end (21) of the optical fiber (20) is  
24 separated from engagement with the convex end of the space (33). A concave lens (33')  
25 is formed on the other layer of the 3D image presenting plate (10) to disperse the light

1 from the distal end (21) of the optical fiber (20).

2 With reference to Fig. 7, the 3D image presenting plate (10) is changed to a  
3 column and has concave lenses formed on opposite side faces of the 3D image  
4 presenting plate (10) to form the 3D image presenting unit (34). Each of the optical  
5 fibers (20) corresponds to one of the lenses on one side of the 3D image presenting plate  
6 (10). With reference to Fig. 8, the 3D image presenting plate (101) is a large surface and  
7 multiple light directing units (22) are formed on one side of the 3D image presenting  
8 plate (101) to engage with optical fibers (not shown in this embodiment).

9 With reference to Fig. 9, the optical fiber (20) is received in the space (50) in the  
10 3D image presenting plate (10). The space (50) has a flat end engaged with the distal end  
11 (21) of the optical fiber (20) and a convex lens at the other end of the space (50). With  
12 reference to Fig. 10, the optical fiber (20) is received in the space (51) in the 3D image  
13 presenting plate (10). The space (51) has a convex lens at a distal end of the space (51).

14 With reference to Fig. 11, it is noted that the space (60) defined in the two-  
15 layered 3D image presenting plate (10) is defined with a flat end engaging with the  
16 distal end (21) of the optical fiber (20) and an arcuate projection (60'). A coating (601) is  
17 provided to an inner face of the space (60). After the axial alignment between the optical  
18 fiber (20) and the space (60) is completed, the light from the optical fiber (20) passes  
19 through the space (60). Due to the optical effect of the arcuate projection (60'), the  
20 transmitted light is able to be presented in an apparent three dimensional manner.

21 With reference to Fig. 12, it is noted that the 3D image presenting unit (61) is a  
22 conical space defined in the 3D image presenting plate (10) and has a coating (611)  
23 applied to an inner face of the conical space (61). The conical space (61) has a convex  
24 end to function as a convex lens.

25 It is to be understood, however, that even though numerous characteristics and

1 advantages of the present invention have been set forth in the foregoing description,  
2 together with details of the structure and function of the invention, the disclosure is  
3 illustrative only, and changes may be made in detail, especially in matters of shape, size,  
4 and arrangement of parts within the principles of the invention to the full extent  
5 indicated by the broad general meaning of the terms in which the appended claims are  
6 expressed.